Changes for the Better



Using ICC ETH-1000 EtherNet/IP Interface with Mitsubishi iQ PLC

Start Guice Start

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FURTHER READING REFERENCE LIST

<u>Mitsubishi</u>

Q Corresponding MELSEC Communication Protocol Reference Manual SH(NA)-080008-K QnUCPU User's Manual Communication via Built-in Ethernet Port SH(NA)-080811ENG-B Q Corresponding Ethernet Interface Module User's Manual (Basic) SH (NA)-080009-N

<u>ICC</u>

Instruction Manual: ETH-1000 Multiprotocol Ethernet / RS-485 Gateway

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Chapter 1 Introduction

This document provides instructions and examples on how to configure a system consists of Rockwell ControlLogix PLC, an ICC ETH-1000 Gateway, and Mitsubishi iQ PLC system. An Example of the system configuration is shown in Figure 1 below.



Figure 1 EtherNet/IP Connectivity – Rockwell PLC to Mitsubishi iQ PLC

The system configurations enable Rockwell PLCs to read and write both bit and register data of Mitsubishi iQ PLC using either EtherNet/IP Implicit or Explicit Messaging protocols. Both the built-in Ethernet port on an iQ CPU and an external Ethernet module can be used for this communication.

ICC ETH-1000 Gateway module is used to convert the EtherNet/IP protocol to Mitsubishi MELSEC Communication (MC) Protocol that is supported by Mitsubishi iQ PLCs.

It is assumed that the user of this guide is familiar with the Rockwell RSLogix5000 environment, the operation of Mitsubishi iQ PLCs, and has sufficient knowledge of the ICC ETH-1000 Gateway. It is critical for the users to refer to the manuals when setting up the system parameters for EtherNet/IP applications.

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Chapter 2 System Overview

A Verification System is used as a test bed for verifying the steps documented in this Quick Start guide. The Verification System is shown in Figure 2 below with the IP address assignments of all the devices.



Figure 2 Architecture of an Example Verification System

The Verification System consists of one monitoring PC (e.g. Monitoring Laptop 1), a ControlLogix system, an ICC ETH-1000 module, and one Mitsubishi Q13UDEH PLC system.

The following list contains high-level steps to establish proper EtherNet/IP communication of this Verification System. Each of these steps will be further detailed in subsequent chapters

- 1. Connect the programming/monitoring PC, Rockwell PLC, ICC ETH-1000, and Mitsubishi PLC system to the Ethernet network
 - a. Configure all devices to have proper IP addresses and subnet masks as shown above.
 - b. Ensure that RSLogix5000, ICC Gateway Configuration Utility, and Mitsubishi GX Works2 or GX Developer software packages are installed on the programming PC.
- 2. Create a project using the RSLogix5000 software to interface with the Mitsubishi PLC.
 - a. Add the ICC ETH-1000 as a Generic Ethernet Module in the RSLogix5000 project.
- 3. Configure ICC ETH-1000
 - a. Configure EtherNet/IP Parameters
 - b. Map the ControlLogix Tags for the ETH-1000 to the internal ETH-1000 database locations
 - c. Map ICC ETH-1000 internal database locations to proper controller register and/or bit locations for the PLC.
- 4. Configure iQ system
 - a. Configure the Built-in Ethernet port on the iQ CPU
 - b. Configure the Ethernet port on an external Q71E71 module if necessary

Chapter 3 Connecting Devices to the Network

The steps of configuring the IP addresses of the ControlLogix PLC system, the ICC ETH-1000 module, and the PLC are documented in this chapter.

3.1 Changing the IP Address of the ControlLogix System

The minimum configuration of a ControlLogix system consists of a ControlLogix chassis (e.g. 1756-A7), a power supply (e.g. 1756-PA72), a ControlLogix Controller (e.g. 1756-L61), and an EtherNet/IP module (e.g. 1756-ENBT).

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The steps here document the procedure to modify the IP address of a 1756-ENBT module to add the ControlLogix system on the same network with the Mitsubishi PLC and the ICC ETH-1000 module. It is assumed that there is already an IP address assigned to the ENBT module. If configuring a brand new ENBT module is necessary, please consult the user manual of the Rockwell ENBT module.

- Power on the Rockwell system and monitor the display scrolling across the front of the ENBT module. If the module is working properly, the message "OK Rev x.x.x IP1.IP2.IP3.IP4" should scroll across the display. Rev x.x.x is the revision number of the module firmware, and IP1.IP2.IP3.IP4 forms the current IP address of the module. For example, the message is "OK Rev 2.3.1 192.168.1.30"
- 2. Connect a configuration PC on the network. Change the IP address of the PC to be in the same subnet as the 1756 ENBT module.
 - Note: it is assumed that changing the IP address on a PC is known by the users of this manual. If required, please consult Windows OS Help File.
- 3. Open the RSLinx Classic on the configuration PC and select Communications -> RSWho and expand the tree to see the following screen showing the system configuration:



4. Right-Click on the ENBT Module and select "Module Configuration" from the drop down list:

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5. Under the "Port Configuration" tab, select the Network Configuration Type to be "Static", and one can modify the IP address and the Network Mask to the desired values. Click "OK" and save the new IP address configuration. The new IP address should scroll across the front of the ENBT module.

1756-ENBT/A Configuration	J							×					
General Port Configuration													
 Static 													
 Use DHCP to obtain network configuration. Use BOOTP to obtain network configuration. 													
IP Address: 192 . 168 . 1 . 30													
Network Mask:	255		255		255		0						
Gateway Address:	0		0		0		0						
Primary Name Server:	0		0		0		0						
Secondary Name Server:	0		0		0		0						
Domain Name:													
Host Name:													
🔽 Auto-negotiate po	rt speed	anc	l duple	ж									
Current Port Speed:	100						-						
Current Duplex:	Full dup	lex					-						
(Changes to Port Speed an	d Duple:	k re	quire n	nod	ule res	et.)							
Status: Network Inter	face Cor	ifigu	red	_									
OK Ca	ncel		App	yly			Help						

6. Once the new IP address is set, it is very likely (depending on what IP address and Network mask were assigned to the ENBT module) that the Configuration PC will no longer be able to communicate with the ENBT module. The IP address of the Configuration PC will need to be changed to be in the same subnet of the ENBT module before the communication can be re-established.

3.2 Changing the IP Address of the ICC ETH-1000 Module

The "ICC Gateway Configuration Utility" should be loaded on a Configuration PC that is used to configure the ICC ETH-1000. The ETH-1000 module can be powered using an USB connection, a Power Over Ethernet (POE) connection or an external 7- 24V power supply.

Using the USB connection between the Configuration PC and the ICC ETH-1000 is the most straightforward method to perform the initial configuration of the ICC Module.

1. Launch the "ICC Gateway Configuration Utility" on the Configuration PC and connect a USB cable to the ICC device.

		Statu Please select	is : a device		Device Solution Selected Auto Connect
Port A Configuration	Port B Configuration	Timeout Configuration	Monitor	Finder	
Protocol Selection Protocol Baud Rate Address Address Scan Rate (ms)	V V	No Configuration			
		Options Create	Update	Delete	Delete All

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2. Click the "Auto Connect" button, and the ETH-1000 module will be connected, and the screen will be populated with the current information:

le periore belo	LCC Gateway Configuration Utility	
Status Connected Object Memory Used: 00.0% Ethernet Configuration RS-485 Configuration Timeout Configuration Protocol Selection Protocol Selection Protocol Selection Protocol Selection Protocol Selection Protocol Selection Protocol Selection Protocol Selection Protocol Selection Protocol Selection Protocol Selection Protocol Selection Protocol Selection Protocol Selection Protocol Selection Protocol Selection Protocol Selection Protocol Selection Protocol Selection Protocol Selection Protocol Selection Paity Paity <	Eile Device Help	
Status Device Corrected Object Memory Used: 00.0% Modbus: BACnet/ Firmware Version 0.90 Ethernet Configuration RS-485 Configuration Timeout Configuration Montor Finder Protocol Selection Ethernet Configuration Baud Rate Image: Configuration Baud Rate Image: Configuration Baud Rate Image: Configuration Modbus: CP MELSEC Address Image: Configuration Image: Configuration Baud Rate Image: Configuration Baud Rate Image: Configuration Baud Rate Image: Configuration	🖻 🖬 10 to 🍣 🌩	
Ethernet Configuration RS-485 Configuration Timeout Configuration Monitor Finder Database: Little Endan Protocol Selection Protocol Ethernet Multiple Ethernet Configuration BACnet/IP EtherNet/IP Medbus/TCP MELSEC Authentication User Name froot Password icc IP Settings C Obtain network address automatically C Use a static IP address IP Address 192.168.1.1.102 Subnet Mask 255.255.255.0 Default Gateway 192.168.1.1.1 Options Create Update Delete Delete AI	Cc Dbject Mer	Status Device mnected moy Used: 00.0% Device Firmware Version 0.900
Protocol Selection Protocol Ethemet Multiple Baud Rate Parky Address Timeout (ms) Scan Rate (ms) Options Options Create Update Delete Delete Al	Ethernet Configuration RS-485 Configuration Timeout Configuration	Monitor Finder Database: Little Endian
Protocol Ethemet Multiple Authentication Protocol Protoco	Protocol Selection Ethernet Configuration	
Baud Rate Parity Parity Address Timeout (ms) Con Rate (ms) Con Rate (ms) Con Rate (ms) Create Update Delete Delete Al	Protocol Ethernet Multiple	
Parity Address Timeout (ms) CoBrain network address automatically C Use a static IP address IP Address IP Address ISC an Rae Delete Delete AI Delete AI	Baud Rate	root
Address IP Settings Or Dotain network address automatically C Obtain network address automatically C Use a static IP Address IS2 . 168 . 1 . 102 Subnet Mask 255 . 255 . 0 Default Gateway 192 . 168 . 1 . 1 Options Create Update Delete All		
Address Settings Timeout (ms)		
Timeout (ms) Collar Hervick address automatically C Use a static IP address IP Address 192.168.1.102 Subnet Mask 255.255.255.0 Default Gateway 192.168.1.1 Options Options Options Options Options Options	Address I IP Settings	and address scherefferth.
Scan Rate P Address 192.168.1.102 UP Address 192.158.1.102 Subnet Mask 255.255.255.0 Default Gateway 192.168.1.1 Default Gateway 192.168.1.1 1 Default Gateway 192.168.1.1 1 Image: Create Control of Cre	Timeout (ms)	c IP address automatically
Subnet Mask 255 . 255 . 0 Default Gateway 192 . 168 . 1 . 1	Scan Rate	192 168 1 102
Options Create Update Delete All	Subnet Mask Default Gateway	255.255.255.0 192.168.1.1
Create Update Delete All	Options	
	Create	Update Delete Delete All
		<u>♥</u>

The proper device type is shown with a green LED lit showing the connection has been established. The firmware type, version, and Database type are also shown on the screen.

- 3. The user can modify the IP address and Subnet Mask information on this screen.
- After making the changes, select the Download Configuration to Device button to load the new configuration to the ETH-1000. A warning message will pop-up, select OK to continue download the new IP address

ownload	ICC Generation IIIIIIy File File <t< th=""><th></th><th>Device © ETH-1000 Modbus - BACnet</th></t<>		Device © ETH-1000 Modbus - BACnet
λοnfiguration	Chiert Memoy Used: 00.0% Chiert Memoy Used: 00.0% Ethernet Configuration Protocol Selection Protocol Selection Baud Rate Parky Addexs Inc. Griteway Configuration Utility Timeout (inc) Scan Rate Inc. Griteway Configuration Utility Vou are about to overwrite the configuration on the de Inc. Griteway 192 - 188 - 1 - 1 Default Gateway 192 - 188 - 1 - 1	Finder edue/TCP MELSEC	Finnwere Version 0.300 Davlasse: Little Endian
	Cptores Update	Delete	Delete Al

5. After the download, the system will need to be reset for the changes to take effect. Click "Yes" to the pop-up message and the ETH-1000 will go through the reset sequence

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File Device Help	iguration Utility					
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166		Stal Configuration upda Object Memory	us ted successfully. Used: 00.0%	ī		Device ETH-1000 Modbus - BACnet Firmware Version 0.900 Database: Little Endian
Ethemet Configura	tion HS-485 Configuration	Timeout Configuration	Monitor		Finder	
Protocol Selection Protocol Baud Rate Parity Address Timeout (ms) Scan Rate (ms)	Ethemet Multiple	Ethernet Configuration Authentication User Name froo Password foc ICC Gateway Configuration DUI ICC Gateway Configuration DUI The device nuest be re Would you like to resu Yes Default Gateway	ACREVIP EtherNet	VIP Modbus/	TCP MELSEC	
		Diptions Create	Update		Delete	Delete All

6. After the ETH-1000 system reboot, the screen should show the new IP address. In this example, the IP address was changed to 192.168.5.190.

File Device Help		
🖻 🖬 10 to 🍣 🐡		
166	Device	
Ethernet Configuration RS-485 Configuration	Timeout Configuration Monitor Finder	Database: Little Endian
Protocol Selection	Ethernet Configuration B&Cnet/IP EtherNet/IP Modbus/TCP MELSEC	
Protocol Ethernet Multiple	Authentication User Name froot Password icc IP Settings C Dtain network address automatically C Dtain network address automatically C Use a static IP address IP Address 192.168.5.190 Subnet Mask 255.255.0 Default Gateway 192.168.5.1	
	Options Create Update Delete	Delete All

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3.3 Changing the IP Addresses of the iQ PLC Built-in Ethernet Port

2

The following are steps to change the IP address of the iQ PLC Built-in Ethernet Port:

- 1. Open the GX Works2 on the Configuration PC and create a new project for the appropriate CPU Module (e.g. Q13UDEH in this example).
- 2. Select the PLC Parameter on the Project Tree which will open the "Q Parameter Setting" window. Then select the "Built-in Ethernet Port Setting" tab.
 - a. Configure the IP address, Subnet Mask and Default Router IP address to the desired settings.
 - b. Change the IP address to the desired address and then select the Enable Online Change (FTP, MC Protocol) Check box.

MELSOFT Series GX Works2nt\ETI	+-1000\CLX iQ Test\CLX iQ Test\CLX iQ Test - [Global Label Setting CLXiQ_Test]	
Project Edit Eind/Replace Compile	e <u>V</u> iew <u>Online</u> De <u>b</u> ug <u>D</u> iagnostics Iool <u>Wi</u> ndow <u>H</u> elp	_ 8 ×
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· 🖀 🗸		
	*置 •置 •置 •	
Project 🕂 🕈 🗙		a) d Þ 🗸
CLX iQ Test		Address 🔺
	PLC Name PLC System PLC File PLC RAS Boot File Program SFC Device I/O Assignment Multiple CPU Setting Built-in Ethernet Port Setting	
EthernetConnectionModuk		
USBConnection		%MW/0.1700
Parameter PLC Parameter		%MW0.1701
Network Parameter	IP Address Setting Open Setting	
CC-Link	Input Format DEC.	
Remote Password Structured Data Types	IP Address 192 168 1 40	%MW/0.1702
🗉 🦲 Global Label	Time Setting	
Program_Hie_Pool POU_Pool	Subhet Mask Pattern	
Device Comment	Default Router IP Address 192 168 1 1 Set if it is needed! Default / Channed)	
Device Initial Value		
Intelligent Function Module	Communication Data Code	
	🕫 Binary Code	
	C ASCII Code	
	- IV Enable online change (FTP, MC Protocol)	
	Disable direct connection to MELSOFT	
	De net respect to search for CPU (Puilt in Ethernet net) as natural	
) Do not respond to search for CPU (built-in Ethernet port) on network	
	[
	Print Window Print Window Preview Acknowledge XY Assignment Default Check End Cancel	
	45	
< >	47 · · · · · · · · · · · · · · · · · · ·	
Project TSelection		
	Structured O13UDEH Host Station Line 11 Col. 2	CAP NUM

c. Click the Open Setting box and enter the first channel as MC Protocol with a proper Host Station Port number (In this example, the Port Number is set at Hex 5001)

	Protoco	ı	Open System		TCP Connection	Host Station Port No.	Destination IP Address	Destination Port No.			
1	TCP	•	MC Protocol	•	-	5001					
2	TCP	•	MELSOFT Connection	•	-						
3	TCP	•	MELSOFT Connection	•	•						
4	TCP	•	MELSOFT Connection	•	-						
5	TCP	•	MELSOFT Connection	•	-						
6	TCP	•	MELSOFT Connection	•	-						
7	TCP	•	MELSOFT Connection	•	-						
8	TCP	•	MELSOFT Connection	•	-						
9	TCP	•	MELSOFT Connection	-	-						
10	TCP	•	MELSOFT Connection	•	-						
11	TCP	•	MELSOFT Connection	•	-						
12	TCP	•	MELSOFT Connection	•	-						
13	TCP	•	MELSOFT Connection	•	-						
14	TCP	•	MELSOFT Connection	•	-						
15	TCP	•	MELSOFT Connection	•	-						
16	TCP	•	MELSOFT Connection	•	-						
Host station port No, destination port No: Please input in HEX.											

3. Download the parameter settings to the PLC.

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3.4 Configuring the External Ethernet Module in the iQ System

When application requires, an external Ethernet module can be added to the system and communicating to the iQ CPU. This section describes the configuration of a QJ71E71-100 module to be used in the communication with a CLX through the ICC ETH-1000 gateway.

- 1. Select the Network Parameter-> Ethernet/CC IE/MELSECNET on the Project Tree which will open the parameter setting window.
 - a. Select the Network Type to be "Ethernet."
 - b. Set up appropriate Network, Group, and Station numbers depending on the application network topology. In the verification system, the Network Number is set to be 1, the Group Number is set to 1, and the Station Number is set to 2.
 - c. Set the Mode to "On Line."
 - d. Click "Operation Setting" to go to the next steps.

MELSOFT Series GX Works2nt/ETH-1000/CLX iQ T	est\CLX iQ Test\CLX iQ Test - [Network	Parameter Setting the Number of M	ELSECNET/CC IE/Ethernet Cards]	
Project Edit Eind/Replace ⊆ompile View Onlin	e Debug Diagnostics Iool Windo	w <u>H</u> elp		_ @ ×
D 🛱 🖬 🗸 📷 🖞 🖓 🖬 💼 🖙 ભ 🛤 🐇	* 7 2 3 4 .			
Project # X	Task Satting Task 01 Blassill	what Satting areast [DDC]	ant Cabal Label Setting CLVO Test	Network Parameter Setting
CX IQ Test Connection Destination CX IQ Test CY Connection Module CY Connection CY Connection		abel Setting prog1 [PRG] Prog1	Module 2 Module 2 None Module 2 Module 2	Network Parameter Setting Module 3 Module 3 Module 3 Module 4 Module 3 Module 4 Mo
	Print Window Print Window			
But wolecci ILL selection				
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- 2. At the "Ethernet Operation Setting window", one can configure the IP address of the Ethernet module.
 - a. Set the Communication Data Code to Binary

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- b. Check the "Enable Online Change" checkbox
- c. Select the "Initial Timing" to be Always wait for OPEN (Communication possible at STOP time). This is a critical step to ensure proper communication between the Ethernet module and the ICC ETH-1000.

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- d. Select the "Use the KeepAlive" function.
- e. Click "End" to return to the Network Parameter Setting Window

Ethernet Opera	tion Setting				×
Communication	n Data Code e		Initial Timi	ng t wait for C tible at STC	DPEN (Communications DP time)
C ASCII Code)		 Alway possib 	s wait for (le at STOP	DPEN (Communication time)
- IP Address Sel	tting	,			Send Frame Setting
Input Format	DEC. 💌				Ethernet(V2.0)
IP Address	192	168	1	45	C IEEE802.3
I Fnable Onlin	e Change			P Existence Use Use	e Confirmation Setting the KeepAlive the Ping
		End		ancel	

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- 3. At the Network Parameter Setting window, click "Open Setting" and open the window below and enter the parameters as shown:
 - a. Configure the Host Station Port Number to match the Connection Object port number configured in the ICC ETH-1000.

	Protocol		Open System		Fixed Buffer		Fixed Buffer Communication Procedure		Pairing Open		Pairing Open		Pairing Open		Pairing Open		Pairing Open		Pairing Open		Pairing Open		Pairing Open		Pairing Open		Pairing Open		Pairing Existence Open Confirmation		Host Station Port No.	Destination IP Address	Destination Port No.
1	TCP ·	•	Unpassive	•	Receive	•	Procedure Exist	•	Disable	•	No Confirm 🖵	5001																					
2		•		•		•		٠		•	•																						
3		•		•		•		٠		•	•																						
4		•		•		•		•		•	-																						
5		•		•		•		•		•	•																						
6		•		•		•		•		•	•																						
7		•		•		•		•		-																							
8		•		•		•		•		•	•																						
9		•		•		•		•		•	•																						
10		•		•		•		•		•																							
11		•		•		•	·	•		•	•																						
12		•		•		•		•		•	•																						
13		•		•		•		•		•	•																						
14		•		•		•		•		•	•																						
15		•		•		•		•		•	•																						
16		•		•		•		•		•	•																						

Host station port No, destination port No: Please input in $\ensuremath{\mathsf{HEX}}$.

N

End Cancel

Chapter 4 ControlLogix PLC Project Configuration

The configuration steps of a ControlLogix project are described this Chapter. These steps are used to communicate with an ICC ETH-1000 module. It is assumed that the user has basic knowledge in using RSLogix5000 software to perform the basic configuration steps.

4.1 Adding the 1756 ENBT Module

1. Create a new project in the RSLogix5000 using the proper revision level as the ControlLogix controller. In this example, the revision level is 16.

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New Controller		×
Vendor:	Allen-Bradley	
<u>T</u> ype:	1756-L61 ControlLogix5561 Controller	OK
Re <u>v</u> ision:	16 🔽	Cancel
	Eedundancy Enabled	Help
Na <u>m</u> e:	ICC_ETH_1000	
Descri <u>p</u> tion:		
	~	
<u>C</u> hassis Type:	1756-A7 7-Slot ControlLogix Chassis	
Sl <u>o</u> t:	0 Safety Partner Slot:	
Cr <u>e</u> ate In:	C:\RSLogix 5000\Projects	Browse

2. Right Click on the 1756 Backplane Selection and choose "New Module..."



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3. In the "Select Module" pop-up window, choose the "Communications"



4. Then select the proper module 1756 ENBT



5. Then select the Major Revision level of the ENBT firmware. In the Verification System, the major revision level of the ENBT module is 2.



6. Enter the proper Name, Slot Location, Revision Level and IP Address of the ENBT module. In the Verification System, the module name is set at CSC_EIP, the revision firmware level is 2.3, the module is in Slot 1 of the ControlLogix Chassis, and the IP address is set at 192.168.1.30, matching the previous configuration.



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7. Click "OK" to accept the configuration and make no additional configuration changes to the "Connection" tab. Simply click "OK" again to accept the configuration.

4.2 Adding the ICC Module

The following steps are used to add the ICC module for communication using I/O Messaging (or Implicit Messaging method).

1. Right click on the "Ethernet" icon under the ENBT module which is added to the project and select "New Module..."



2. Select the "Communications" and expand the tree for additional selection.

👸 RSLogix 5000 - CSC_ICC_Te	st in ICC_ETH_1000.ACD [17	56-L61]*		
File Edit View Search Logic	Communications Tools 1	Window Help		
		▼ [®]	a a te re ca	
Offline DI		Rath: Znone>		2
No Forces	`_ _	Taux Chones	_	
No Edits	0	at the back of the	احتيا عنا حيا عن	
Redundancy	Select Module			
	lu u			
Controller CSC_ICC_	Module	Description	Vendor	
Controller Fault H	. Digital			
Power-Up Handle	Drives			
- 🔄 Tasks				
🗄 🕞 MainProgram				
Unscheduled Pro				
🖻 🔄 Motion Groups				
Add-On Instructions				
🚊 🔄 Data Types				
User-Defined				
E Redefined	1			
Module-Defined			Find Add Fav	vorite
Trends	By Category By	Vendor Favorites		
🗄 🚍 1756 Backplane,				
- 📴 [0] 1756-L61			Cancel Help	
⊡ [1] 1756-ENB		N		
		54		
Rue Cire				
I Dus Size				
Ready				

3. Choose the Ethernet-Module Generic Ethernet Module

🔞 RSLogix 5000 - CSC_ICC_Test in ICC_ETH_1000.ACD [1756-L61]*	
File Edit View Search Logic Communications Tools Window Help	
Offline 🛛 🗸 🗖 RUN 💦 Path: <none></none>	
No Forces	
Redundancy No Select Module	
Controller CSC_ICC Module Description Vendor	
Controller Tags - 1/38-EWEB/A 1/38 10/100 Mbps Ethernet Bridge w/Enhanced Web Serv., Allen-Bradley A	
Controller Falue T79T-ACIV[A 1799 10/100 Mbs Ethernet Adapter, Fluer media Aller Pradley T09T-ACIV[A 1799 10/100 Mbs Ethernet Adapter, Tuisted-Dair Media Aller-Bradley	
Tasks - 1794-AENT/8 1794 10/100 Mbps Ethernet Adapter, Twisted-Pair Media Allen-Bradley	
😑 🛱 MainTask – Drivelogix5730 Eth 10/100 Mbps Ethernet Port on DriveLogix5730 Allen-Bradley	
😥 🖶 MainProgram 🛛 – ETHERNET-BRIDGE Generic EtherNet/IP CIP Bridge Allen-Bradley	
Unscheduled Pro – ETHERNET-MODULE Generic Ethernet Module Allen-Bradley	
Motion Groups – EtherNet/IP SoftLogix/S800 EtherNet/IP Allen-Bradley	
Add Ob Text where B Dishe Dish	
User-Defined 🕑 HMI	
🕀 🛱 Strings	
Add-On-Defined	
Englished	
Addrevened	
Henris By Category By Vendor Favorites	
E 1756 Backplane,	
B [0] 1756-L61 OK Cancel Help	
E - [] [1] 1756-ENB	
Ethernet	
Bus Size	
Ready	

4. Double Click on the selection and configure the ICC module accordingly. This is a critical configuration step to ensure the ETH-1000 will work properly in the system as the application requires. Please also consult the ICC ETH-1000 User's Manual carefully about the configuration of these items.



- a. Configure the "Comm Format" as "Data-INT" for the overall system to work best with the ICC module and the controller registers. This will allow the transfers to be done in 16 bit integers.
 - Note: For each application, the data type should be configured to match the requirements of the particular application.
- b. Set the IP Address of the generic Ethernet module to the IP address assigned to the ICC module earlier. For example, the IP address of the ICC module is set at 192.168.1.102 In the Verification System.
- c. Configure the "Connection Parameters" as follow:
 - The "Input" Assembly Instance should be set at "150." The size of the Input Assembly buffers should be set at the size appropriate for the application. In the verification system, the buffer is set at 248 16-bit words.
 - The "Output" Assembly Instance should be set at "100." The size of the Input Assembly buffers should be set at the size appropriate for the application. In the verification system, the buffer is set at 248 16-bit words.
 - The "Configuration" is not used and should be set at "1" as the Assembly Instance and 0 buffer size.
- d. Check the "Open Module Properties" box and click "OK" to accept the configuration.

5. Configure the RPI to 10.0 ms.



- 6. Select "OK" to accept the configuration and complete the ICC Module Configuration.
- 7. Double click on the "Controller Tags" selection, and the following tags are automatically created for the ICC ETH-1000 module:



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- a. 248 integer tags were created for CSC_ICC_ETH1000_INT:I. These are the tag locations where ICC will transfer the data to the ControlLogix using Implicit Message protocol every RPI.
- b. 248 integer tags were created for CSC_ICC_ETH1000_INT:O. These are the tag locations where data will be sent to ICC ETH-1000 through Implicit Messaging Protocl every RPI.
- c. The locations in the ICC Database where the data will be written to and read from will be configured using the steps described in the following Chapter.

Chapter 5 ETH-1000 Configuration

The steps to configure the ETH-1000 module to work with the ControlLogix PLC using EtherNet/IP Implicit Messaging and Mitsubishi controllers using MC Protocol are documented.

Configuring the Validation System as shown in Figure 2 is used as the example. Some parameters will need different values to properly reflect the actual system a user is configuring. However, the example configuration can be used to simplify the overall configuration effort.

The user should have gone through the configuration steps as shown in Section 3.2 of this document.

5.1 Configuring the EtherNet/IP Implicit Messaging Communication

1. Select the "Ethernet Multiple" Protocol Selection box and check "EtherNet/IP Server" and "MELSEC Client" selections. Selecting these two check boxes allow the EtherNet/IP and MELSEC tabs to become active. The screen also shows the current IP Address of the ICC Module and the Authentication User Name and Password if they are needed.

CC			Sta Conr Object Memor	itus ected y Used: 00.0%		Device ETH-1000 Modbus - BACnet Firmware Version 0.90
Ethernet Configuratio	n RS-4	35 Configuration	Timeout Configuration	Monitor	Finder	Database: Little Endia
Protocol selection Protocol Baud Rate Parity Address Timeout (ms) Scan Rate (ms)	Elhernet Multip Elhernet Multip BACnet/IP Ethenke/III Modbus/TI	le Server Server P Server	Ethernet Configuration	BACnet/IP EtherNet/IP k address automatically address	Modbus/TCP MELSEC	
			Options Create	Update	Delete	Delete All



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Devices to the Network Select the EtherNet/IP tab of the ICC Configuration screen and define the ICC Database locations where data items will be exchanged between the ControlLogix PLC and the ICC module through the Implicit Messaging protocol.

🛃 ICC Gateway Configuration Utility		
File Device Help		
😂 🖬 10 t0 💸 🛸		
Ethernet Configuration	Status Connected Object Memory Used: 00.0% Timeout Configuration Monitor Finder Ethernet Configuration BACnet/IP EtherNet/IP Modbus/TCP MELSEC Device Name [ETH-1000 Invoke Timeout When Run/Idle flag = Idle Produced Data Start Address 0	Device TTH-1000 Modbus: BACnet Firmware Version 0.900 Database: Little Endian
Scan Rate	Consumed Data Start Address 2048	Delete All

In this example, the "Produce Data Start Address" of the ICC module is set at Database Location 0 and the "Consume Data Start Address" at 2048. These addresses are referring to the database in the ICC module that will be used to transfer data between ICC and the ControlLogix tags. The "Produced" and "Consumed" terms are from the ICC Module perspective. The following diagram is helpful to explain how the data items are assigned and transferred.



Figure 3 Mapping CLX Data to ICC Database Locations

The database addresses in the ICC are used to address "byte" data locations. Thus, 248 words will take up 496 database addresses.

3. Select the "Monitor" tab and check the "Display Usage" checkbox to show the DB memory locations that are configured for use by both the Produced and Consumed data.



5.2 Configuring the MELSEC Protocol

The steps to properly configure the MELSEC Protocol in the ICC ETH-1000 are documented in this section. However, the user should realize that the steps here are examples for a particular configuration to establish the Verification System architecture as shown in Figure 2. For a particular application, the Connection Objects and Service Objects configured in this manual may not work properly without modifications. A user should consult the ICC ETH-1000 manual and understand the information required to be transfer to and from Mitsubishi controllers and the timing requirements.

The critical steps are the configuration of a MELSEC Connection Object and the services that need to be accomplished using this Connection Object. A Connection Object can be configured to represent a physical connection between an ICC ETH-1000 and a Mitsubishi controller. However, this does not have to be the case since a physical connection can support multiple "logical" connections using multiple connection objects depending on the application requirements.

After a Connection Object is configured, multiple Service Objects can be configured for this Connection Object. Each service object defines the tasks that need to be accomplished, for example read 20 words of controller D registers starting from D12287, write 10 words to controller Internal Relay.

5.2.1. Configuring Connection Objects

The following steps are used to create a Connection Object to communicate with a iQ PLC with the IP address 192.168.1.40 using TCP port 0x5001 (e.g. Decimal 20481)

1. Create a name for this Connection Object. The name is "Connection1" for this example.

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- 2. Enter the IP address of the controller that will be connected. The IP is 192.168.1.40 for this example
- 3. Enter the Port Number in decimal. The Port is 20481 or 0x5001 for this example.
- 4. Hit "Create" after the information is entered and the Connection Object is shown as below.

💂 ICC Gateway Configuration Utility	
File Device Help	
🖻 🖬 10 tê 🍣 🌣	
Status Connected Object Memory Used: 00.0%	Device © ETH-1000 Modbus · BACnet Firmware Version 0.900 Device and the Funding
Ethernet Configuration RS-485 Configuration Timeout Configuration Monitor Finder	Database. Little Englan
Protocol Selection Ethernet Configuration RACnet/IP EtherNet/IP Modifics/TCP MELSEC	1
Protocol Ethernet Multiple Connection Object Configuration	
Baud Rate Name Connection1 Create Update	Delete Delete All
Parity PAddress 192 . 168 . 1 . 40 Name	IP Address Port 192.168.1.40 20481
Address Port 28481	
Timeout (ms)	
Scan Rate Description Service Object 1 Starting Po	pint
Connection Connection1 Vum Word	ls
Device Code Internal Relay (M) 💌 Database a	Addr
Code Value 🖉 🖉 Word C Bit	vice Object Status
Function 🔽 Read 🔽 Write	atus Address
_ Options	
Create Update Delete	Delete All
Melsec Service Objects	
Description Connection Dev Code Start Point Num Words DB Address Read En	Write En RS Address

5.2.2. Configuring Service Objects

In the Verification System architecture, four service objects were created for each connection to a controller that is defined:

- Write 20 words from ICC DB to Data Register 12268 Data Register 12287
- Read 20 words from Data Register 12248 Data Register 12267 to ICC DB
- Write 10 words (160 bits) from ICC DB to Internal Relay M7841 M8000
- Read 10 words (160 bits) from Internal Relay M7681 M7840 to ICC DB

Following are the steps to configure a service object to write 20 words from ICC DB to Data Registers 12268 - 12287:

- 1. Select "Connection 1" on the Connection Object Configuration list that has been defined in Section 5.2.1.
- 2. Enter the "Description" to describe this Service Object
- 3. Select the Device Code of the iQ PLC that the data will be transferred. For this example, select "Data Register (D)."
- 4. Check the appropriate checkbox(s) of Function selection. It is important to know that the "Read" and "Write" functions are from the ICC ETH-1000 perspective. In other words, selecting the "Write" checkbox enables the service object to transfer the data items from ICC DB to the designated data register locations using the MC Protocol. For this example, the "Write" checkbox is selected.

- 5. Enter the Starting Point of the Data Registers where the data items will be written into. In this example, the Starting Point is "12268."
- 6. Enter the number of words to be transferred in the "Num Words" dialog box. In this example, the number of words is "20."
- 7. Enter the Database Address (Database Addr.) of the ICC DB where data items are stored and will be written to the controller registers. In this example, the starting DB address is 2048.
- 8. Click the "Create" button to create this Service Object

66		Object 1	Status Connected Object Memory Used: 00.0%				
Ethernet Configura	ation RS-485 Configu	ration Timeout Configuratio	n Monitor	1	Finder	Database: Little End	
Protocol Selection	n	Ethernet Configura	ation BACnet/IP EtherN	let/IP Modbus/T	CP MELSEC		
Protocol	Ethernet Multiple	•	Conr	nection Object Con	figuration		
Baud Rate		Vame Co	nnection2	Create	Update	Delete Delete All	
D. 3.			02 100 10 102	Name	IP	Address Port	
Parity			92 . 168 . 16 . 102	Connection1	192	.168.1.40 20481	
Address]	Port 82	01				
Timeout (ms)			Se	rvice Object Config	guration		
Scan Rate		Description	WritetoiQWord		Starting Point	12268	
(ms)	,	Connection	Connection1	•	Num Words	20	
		Device Code	Data Register (D)	-	Database Addr	2048	
		Code Value	@ Word	C Bit	Service	Object Status	
		Function	E Bead Vite		Reflect Status	Address	
		Options	<hr/>				
		Create	Update	, [Delete	Delete All	
			Consider Oblicate				
Description	Connection	Dev Code Sta	rt Point Num Words	DB Address	Bead En V	Vrite En BS Address	
WritetoiQWor	d Connection1	Data Register (D) 1	2268 20	2048	No	Yes N/A	

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- 9. Repeat the steps 1-8 to define the other three service objects to perform the transfers between ICC and iQ PLC.
 - a. Define the Service Object to read 20 Data Registers to ICC

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ICC Gateway Configuration Utility				
ile Device Help				
ê 🖬 ↓@ ↑@ 🍣 🌦				
166	Status Connect Object Memory U	ed sed: 00.0%		Device © ETH-1000 Modbus - BACnet Firmware Version 0.900
Ethernet Configuration RS-485 Configuration	Timeout Configuration	Monitor	Finder	Database: Little Endian
Protocol Selection Protocol Ethernet Multiple	Ethernet Configuration BA	Cnet/IP EtherNet/I	P Modbus/TCP MELSE	۰ ۱
Paud Pate	Name Connection1		Create Update	Delete Delete All
Parity V Address	IP Address 192 . 168 Port 20481	. 1 . 40	lame	IP Address Port 192.168.1.40 20481
Timeout (ms)		Service	bject Configuration	
Scan Rate	Description Readfr	omiQWord	Starting P	oint 12248
(ms) J	Connection Conne	ction1	▼ Num Wor	ds 20
	Device Code Data F	eaister (D)	→ Database	Addr 0
	Code Value	© Word C E ad ∏ Write	Sit Se	atus Address
	- Options			
	Create	Update	Delete	Delete All
	Melsec Servic	e Objects		
Description Connection D	ev Code Start Point	Num Words	DB Address Read Er	Write En RS Address
WritetoiuWord Connection1 Data ReadfromiQWord Connection1 Data	Register (D) 12268 Register (D) 12248	20	2048 No 0 Yes	Yes N/A No N/A

b. Define the Service Object to write 10 Words to Internal Relay

	-					Status				De	evice
					(Connected				4	ETH-1000
56				(Dbject M	emory Usec	00.0%			Mo Fin	odbus - BACnet mware Version (
Ethernet Configur	ation	RS-485 Con	iguration	Timeout Conf	iguration		Monitor	1	Finder	Da	itabase: Little Er
Protocol Selectio	n			Ethernet C	onficurati		VIP EtherN	Modbus/	MELSEC	1	
Protocol	Ethern	et Multiple	-	Laterior	oringurad	on passing	- Conn	ection Object Co	ofiguration		
					Carry			Course 1		Dulute	
Baud Rate			Ψ.	Name	Juon	hection I		Lreate	Update	Delete	Delete All
Paritu			-	IP Adda	200 19	2 168	1 40	Name		IP Address	Port
r any	-			II Addi		. 100 .	1.40	Connection1		192.168.1.4	0 20481
Address				Port	2048	31					
Timeout (ms)							Ser	vice Object Confi	iguration		
Scan Rate				Descrip	tion	WritetoiQE	it		Starting Poi	nt 7841	
(ms)	1			Conner	tion	Connectio	n1		Mum V Cords	10	
				Connec	20011	Connectic	m		Nulli Words	. 110	
				Device	Code	Internal R	elay (M)	-	Database A	ddr 2088	
				Code V	alue		€ Word (D Bit T	Serv	vice Object S	tatus
				Functio	n	☐ Read	Vrite		Reflect Stat	tus Addre	ess
				Options							
				C	reate	1	Update	1	Delete	1 E	Delete All
						_					
	1	-			Melse	c Service U	bjects		1	[
Description		Lonnection	Dette	Jev Code	Start	Point	Num Words	DB Address	Head En	Write En	HS Address
BeadfromiQW	ra ord	Connection1	Data	a negistêr (D) a Begister (D)	12	268	20	2048	No Yes	No	N/A N/A
WritetoiQBi		Connection1	Inter	nal Relay (M)	78	41	10	2088	No	Yes	N/A
		0487-00000									

c. Define the Service Object to read 10 words of Link Relay to ICC

CC				Object N	Status Connected					Device ETH-1000 Modbus - BACnet Firmware Version 0.9	
Ethernet Configura	ation RS-4	85 Configural	ion Ti	meout Configuratio	n	Monitor	1	Finder	Dal	abase: Little Endi	
Protocol Selection	n			Ethernet Configura	tion BACn	et/IP EtherNet	Modbus/	TCP MELSEC			
Protocol	Ethernet Multi	ole	-			Conner	ction Object Co	nfiguration			
Baud Rate		1	T	Name Cor	nection1		Create	Update	Delete	Delete All	
	,		-			1 10	Name		IP Address	Port	
Parity			-	IP Address 1	92.168.	1.40	Connection1		192.168.1.40	20481	
Address	1			Port 204	81						
Timeout (ms)						Servi	ice Object Conf	iguration			
Scan Rate			-	Description	Readfrom	iQBit		Starting Poir	nt 7681		
(ms)	1			Connection	Connectio	on1	•	Num Words	10		
				Device Code	, Internal B	elav (M)	•	Database A	ddr 40		
						G Word C		Serv	ice Object St	atus	
								Reflect State	us Addre	\$\$	
				Function	M Head	I Write					
			-	Ontions							
				Create	1	Undate	1	Delete		Delete All	
								0.000		000001	
				Mels	ec Service C	bjects		1			
Description	Conn	ection	DevC	Code Star	t Point	Num Words	DB Address	Read En	Write En	RS Address	
ReadfromiQWo	u Lonne ord Conne	ction1	Data Reg	ister (D) 1.	2248	20	2048	Yes	No	N/A	
	Conne	ction1	Internal B	elau (M) 7	841	10	2088	No	Yes	N/A	



5.2.3. Configuring the Connection Object for QJ71E71 Ethernet Module

Repeat steps documented in Sections 5.2.1 and 5.2.2 to configure the Connection and Service objects to communicate to the external Ethernet module in the system.

- 1. Creat a Connection Object first with name Connection2. Enter the IP address of the Ethernet module and the Port number (e.g. 20481 or Hex5001 as configured in Section 3.4.
- 2. Create the Service Objects to read and write 20 words from and to D registers and 10 words from and to Internal Relays.

C Gateway Configur	ation Utility							
Device Help								
🗆 I A TA 🔕 🐁								
			Status				De	vice
			Connected	С.			6	ETH-1000
EE							Mo	dbus - BACnet
		Ob	ject Memory Use	d: 00.0%			Fin	mware Version 0.900
							Da	tabase: Little Endiar
Ethernet Configuration	RS-485 Configurati	on Timeout Config	uration	Monitor		Finder		
Protocol Selection-		Ethomat Can	eel pac-	and market		MELSEC		
Protocol	la nava në kala dhimba	Ethernet Con	inguration DBCr			CE MELSEC		
				Conn	ection Object Con	figuration		
Baud Rate		Name	Connection2		Create	Update	Delete	Delete All
							ID A LL	
Parity	7	IP Addres:	s 192 . 168 .	1 . 45	Name		IF Address	Port
E					Connection I		92.168.1.4	J 20481
Address		Port	20481		Connection2		132.100.1.4	J 20401
Timeout (ms)		-		Ser	rvice Object Confic	uration		
rimeour (ms)					thee object coning	Jurddon		
Scan Rate		- Descriptio	on WritetoiQ	WordEport		Starting Poin	it 12228	
(ms)		Connectio	n Connecti	on2	-	Num Words	20	
			1					
		Device C	ode Data Rej	gister (D)	-	Database Ad	ddr 2128	
				C Word C	Rit I	Servi	ce Object S	tatus
		0000 ya	uo	< word a	- Dit	Beflect State	is Addre	
		Function	🗌 Read	Vrite		Theneou state	Ao Addin	
		0-6-4						
		Uptions	1		1	1		1
		Crea	ate	Update		Delete		Delete All
			Meisec Service	Diects				
Description	Connection	Dev Code	Start Point	Num Words	DB Address	ReadEn	Write En	HS Address
WritetoiQWord	Connection1	Data Register (D)	12268	20	2048	No	Yes	N/A
HeadfromQWord	Connection I	Data Register (D)	7941	20	2099	Yes	No	N/A N/A
BeadfromiOBit	Connection1	Internal Relay (M)	7691	10	2000	Yes	No	NZA NZA
WritetoiQWordF	Connection2	Data Register (D)	12228	20	2128	No	Yes	N/A
ReadfromiQWor	Connection2	Data Register (D)	12208	20	80	Yes	No	300
Writetoi@BitEport	Connection2	Internal Belay (M)	7521	10	2168	No	Yes	N/A
wincoldplicpoin		the second		10				

5.2.4. Calculating the ICC ETH-1000 DB Addresses

One of the most important steps in configuring a service object is to determine the Database Address that needs to be entered. Since the ICC ETH-1000 DB is a "shared database" between EtherNet/IP and MELSEC protocols, one has to define carefully which way the data items will be written to and read from.

Figure 3 of this document in Section 5.1 shows the mapping of data from ControlLogix to the ICC DB. This mapping is then expanded to map from ICC DB to the Mitsubishi controllers connected to the ICC gateway in the system.

The following diagram illustrates an example of the mapping the ICC DB to Mitsubishi iQ system with an Built-in Ethernet port and an external Ethernet module. Each Ethernet port transfers 10 words of bit data and 20 words of word data.



The DB addresses configured in the MELSEL service objects are the beginning addresses of each block of data shown above. The ICC DB addresses are "Byte" addresses so that starting address locations need to be adjusted accordingly.

A Microsoft Excel-based database address calculation tool is available from Mitsubishi Electric Automation, Inc. upon request. The tool can be used to calculate the DB locations of MELSEC service objects to assist the configuration efforts. Please contact your MEAU representatives to obtain a copy of this tool.

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Chapter 6 Using EtherNet/IP Explicit Messaging

The ControlLogix PLC can communicate with the Mitsubishi iQ PLC using EIP Explicit Messaging format through the ICC ETH-1000 gateway.

The communication is accomplished through the use of MSG instructions in RSLogix5000. Refer to Sections 11.1.4.5, 11.1.4.6, 8.7.5.1 of the "Instruction Manual: ETH-1000 Multiprotocol Ethernet / RS-485 Gateway" for details on how to configure the MSG instructions properly for communicating with Mitsubishi controllers.

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Implicit (I/O Data) Messaging	Connections are established to move application-specific I/O data at regular intervals. These connections often are set up as one-to-many relationships in order to take full advantage of the producer-consumer multicast model. Implicit messaging uses UDP/IP resources to make multicast data transfers over Ethernet a reality.	Introduction
Explicit Messaging	Point-to-point relationships that are established to facilitate request-response transactions between two nodes. These connections are general purpose in nature and can be used to reach any network-accessible items within a device. Explicit messaging connections utilize TCP/IP services to move messages across Ethernet.	2 verview
EtherNet/IP	EtherNet/IP is the name given to the Common Industrial Protocol (CIP), as implemented over standard Ethernet (IEEE 802.3 and the TCP/IP protocol suite).	System (
User Defined Data Type	User-defined data types allow a user to organize the data to match a machine or process. This streamlines program development and creates self-documenting code that is easier to maintain. A user-defined data type stores all the data related to a specific aspect of a system. This keeps related data together and easy to locate, regardless of its data type.	etter and a second seco
Common Industrial Protocol (CIP)	The Common Industrial Protocol (CIP) is a media independent, connection-based, object- oriented protocol designed for automation applications. It encompasses a comprehensive set of communication services for automation applications: control, safety,	Devices to Network
Connection Object	The CIP Connection Class allocates and manages the internal resources associated with	4
	both I/O and Explicit Messaging Connections. The specific instance generated by the Connection Class is referred to as a <i>Connection Instance</i> or a <i>Connection</i> Object.	gix PLC tion
Service Object	Service is a function supported by an object and/or object class. The Service Object configured for a particular ICC ETH-1000 to a Mitsubishi device connection is used to define what data transfer functions need to be executed.	ControlLo Project Configurat

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Revisions

July 2009 – Document created and Released, Version 1.0

October 2009 – Minor revision to wording throughout the document, Version 1.1